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ABSTRACT

It is a minor paradox of higher education that graduate study, acknowledged to be the most costly and complex phase of university activity, should have the least attention. Institutions vary widely in the amount of self-inquiry they direct toward graduate work, and information collected over a wider area by standard methods has been difficult to come by. Several national studies conducted under the auspices of the American Council on Education, however, offer a useful means of making local and regional comparisons. When data are rearranged into regional or local subsets, the kind of relationships that are revealed give clues about the effects of past policy and future planning. This study collects and organizes the basic data from one such evaluation of graduate faculty to give comparisons that have special significance for Pennsylvania. The collected information for the Commonwealth is compared with similar data for New York, Illinois, Michigan, Ohio, and California and for the top-ranked schools in the study. The nature of the relationships between enrollment and ranking, the number of fields and ranking, and resident students enrolled and ranking make possible some rather clear observations about graduate education in the State. (Author)

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The Quality of Graduate Studies: Pennsylvania and Selected States

Stephen D. Millman

William Toombs

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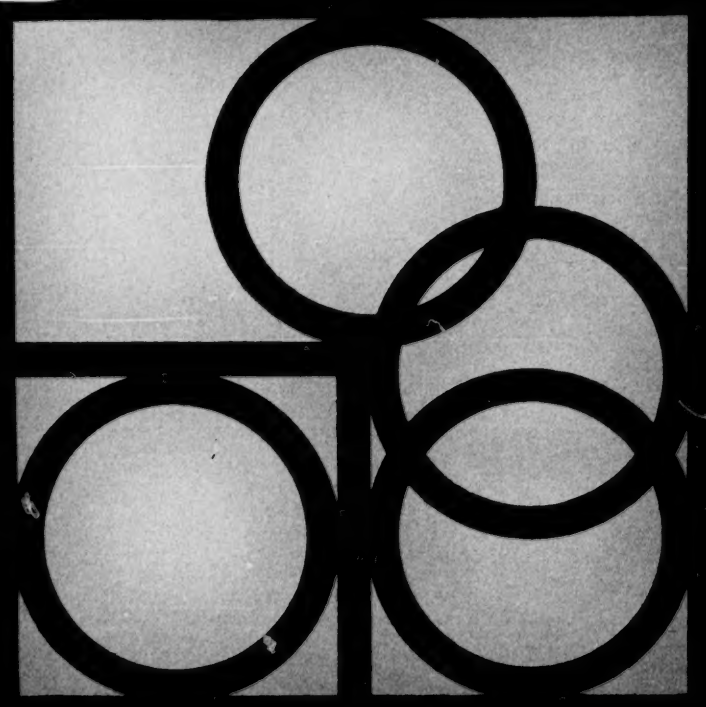

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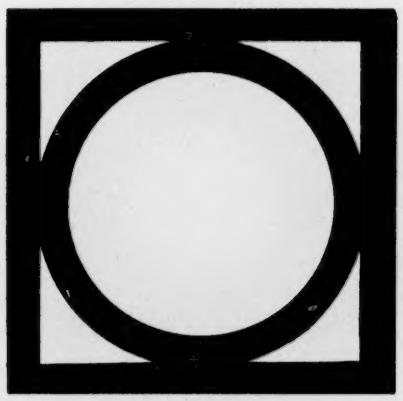

Center for the Study of Higher Education
Report No. 14

The Pennsylvania State University
University Park, Pennsylvania

February 1972

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THE QUALITY OF GRADUATE STUDIES: PENNSYLVANIA AND SELECTED STATES

INTRODUCTION

It is a minor paradox of higher education that graduate study, acknowledged to be the most costly and complex phase of university activity, should have the least attention. Institutions vary widely in the amount of self-inquiry they direct toward graduate work, and information collected over a wider area by standard methods has been difficult to come by. Several national studies conducted recently under the auspices of the American Council on Education however, offer a useful means of making local and regional comparisons.[1] When the data are rearranged into regional or local subsets, the kind of relationships that are revealed give clues about the effects of past policy and future planning, clues that are not attainable by other means.

This study collects and organizes the basic data from the Roose-Andersen evaluation of graduate faculty to give comparisons

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[1]Kenneth D. Roose, and Charles J. Andersen, *A Rating of Graduate Programs* (Washington, D.C.: American Council on Education 1970); and John A. Creager, *The American Graduate Student: A Normative Description* (Washington, D.C.: ACE Research Reports) 6 (5) 1971.

that have special significance for Pennsylvania. The collected information for the Commonwealth is compared with similar data for New York, Illinois, Michigan, Ohio, and California and for the top ranked fifty schools in the study. The nature of the relationships between enrollment and ranking, the number of fields and ranking, and resident students enrolled and ranking make possible some rather clear observations about graduate education in the state.

GRADUATE EVALUATION: A LOOK AT PRECEDENTS

In 1861, a precedent was set in American higher education for in that year Yale awarded the first Ph.D.'s in American history. It is fair to assume that the ink was hardly dry on the parchment before questions arose concerning the quality of that small doctoral program at Yale. "By 1876, the year that Johns Hopkins dedicated itself to the development of the Ph.D., the precedent set by Yale was being followed in twenty-five institutions, which that year awarded a total of forty Ph.D. degrees."[2] By this time, the American penchant for competitiveness must certainly have spawned a desire to know which program

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[2]F. Rudolph, *The American College and University* (New York: Vintage Books, 1962), p. 335.

was the best and why. Such judgments were no doubt made, but they appear to have been made individually and with varying degrees of individual knowledge.

By the turn of the century however, it became obvious that the task of evaluating or grouping schools offering studies leading to the doctorate needed to be approached with more rigor. It is not surprising therefore that in the year 1900, fourteen institutions, which together accounted for 88 percent of all doctorates awarded at that time, came to form the Association of American Universities. While the AAU never set about formally to evaluate institutional programs, it has served a function which might be called evaluation and certification by regulating admission to its ranks. Proposals to make more specific inquiries have been suggested, but not adopted--albeit narrowly so.[3] Nonetheless, membership in AAU has served as an indicator of academic quality to many, including German institutions which at the time of AAU's formation were attracting numerous American scholars. Membership has grown from the original 14 to the present number of 46. To see clearly that membership is still an evaluative measure, one need only note that those 46 members stand in an exceptional condition when compared with the

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[3]G.O. Arlt, "Purifying the Pierian Spring," *The Graduate Journal* VIII (1971): 267-276.

Council of Graduate School's current membership of 300. Membership in CGS is open to institutions that have granted thirty graduate degrees, A.M., M.S., or Ph.D., in at least three fields over a three-year period.

In 1925, Raymond Hughes undertook a modest but pioneering study of the quality of graduate training which was reported to the annual meeting of the American Council on Education.[4] This first formal national ranking was followed in 1934 by another study performed by Hughes. The place of formal evaluation of graduate departments by peer judgment had now been established.

Hayward Keniston was commissioned in 1957 to evaluate graduate programs in the arts and sciences at the University of Pennsylvania.[5] In order to compare the quality of programs in twenty-eight fields at Penn, Keniston collected and analyzed evaluations of that institution along with the other members of the AAU, which then numbered twenty-five.

In addition, various professional organizations have undertaken evaluation studies of graduate programs in their specific

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[4]D.A. Robertson, ed., *American Universities and Colleges* (New York: Scribner, 1928), pp. 161-163.

[5]H. Keniston, *Graduate Study and Research in the Arts and Sciences at the University of Pennsylvania* (Philadelphia: University of Pennsylvania Press, 1959).

disciplines. Such research has been done in history, English, American literature, physics, sociology, psychology, education, and certain other fields.

During the 1964-1965 academic year, Allan M. Cartter, then vice-president of the American Council on Education introduced a new evaluation of the quality of graduate programs.[6] Although there is obviously no perfect way of making such evaluations, many believe the Cartter method to be the most thorough yet devised. At first glance it might appear that such objective yardsticks as size and "quality" of faculty, nature of facilities, type and quantity of funding, etc. might yield a reasonable indication of relative quality among institutions. However, these physical attributes may or may not directly affect the quality of the resulting educational experience. Cartter chose to use the tool of peer evaluation by soliciting the opinion of scholars in regard to their view of quality departments in their field. Such a process is consistent with the use of professional peer judgment as it exists in the medical, legal, and engineering professions.

It was specifically suggested by the study advisory committee that the 1964 study be replicated within five years "to

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[6]Allan Cartter, *An Assessment of Quality in Graduate Programs* (Washington, D.C.: American Council on Education, 1966).

avoid 'fixing' reputations when in fact the academic scene is changing constantly." Following through on this recommendation, a replication with certain modifications was conducted in 1969 by Kenneth D. Roose and Charles J. Andersen.

As with the Cartter study before it, the Roose-Andersen report triggered criticism in regard to rationale and methodology. As Logan Wilson, president of ACE pointed out, "In general, the unhappy critics are those whose institutions did not stand up in the ratings."[7] In bearing out this point, Dutka indicates great dissatisfaction with the report at Columbia, the institution which appears to exhibit the greatest slippage between 1964 and 1969. She notes, "Most professors quickly point out the inability of outsiders to accurately judge the effectiveness of a program, the vagueness of the wording on the questionnaire, the random character of the sample, and the built-in time lag. . ."[8]

There have been concerns which are not tied to a particular institution's individual woes. Jacobson notes the following points which arose at an ACE news briefing to discuss the report:

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[7]R.L. Jacobson, "Ratings of Graduate Departments Raise Questions About Who's 'Best'," *Chronicle of Higher Education* V (January 11, 1971): 9.

[8]E. Dutka, "Poor Marks for Columbia Graduate School," *Change* 3 (1971): 33-34.

1) The selection of respondents was made on certain criteria more than ten years old, thereby creating a bias against newer programs.

2) Some evaluators may have used the catchall "not sufficient information" as a kind way of expressing low esteem.

3) The disciplines studied excluded a number of fields, including education, agriculture, and medicine.

4) All evaluations were one and one-half years old when reported.

5) Some fields had more judges than others.

While the method of peer evaluation may be subjective, a more objective assessment of the outputs of higher education has not yet been fully operationalized but is under investigation.[9] In any case, decisions such as what students apply, what faculty are attracted, and what grants are awarded are probably made largely on the basis of subjective judgments rather than truly objective criteria. Reputation, no matter how imperfect or inaccurate, is a factor to be recognized.

The initial Cartter report and the Roose-Andersen study of graduate quality dealt with two components--rated quality of graduate faculty and rated quality of doctoral programs. The present study deals exclusively with the first component, an emphasis that has been traditional for inter-university comparisons.

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[9] B. Lawrence, G. Weathersby, and V.W. Patterson, eds., *Outputs of Higher Education*, WICHE, July 1970.

AMERICAN COUNCIL ON EDUCATION STUDIES

The Cartter study reported strengths of leading individual institutions by general areas of study. This was as close as the study came to making overall judgments. Any evaluation based on a combination of rankings was eliminated from the 1969 data. Roose and Andersen state, "In this new survey, we have tried to deemphasize the pecking order relationships inherent in most scoring systems, for it is not our purpose to bolster or deflate egos. We have, therefore, not presented scores for individual institutions."[10]

However, if ACE was not willing to publish comparative rankings of institutions, others were quite ready to draw inferences that depended upon an aggregation of the departmental data. Jacobson reports, "The council's report scarcely had been made public when a number of universities sent out news releases of their own, mainly to call attention to survey results that were favorable to them. At least one institution used its own statistical weighting to give itself a higher comparative

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[10]Roose and Andersen, *A Rating of Graduate Programs*, p. 2.

standing than it had attained in the list of those most often in the top five."[11]

Raymond Ewell has developed a simple method for constructing composite scores for institutions. The approach, which was first used in reference to the Cartter study, is described elsewhere.[12] Basically, the technique is as follows. Institutions are awarded points in accordance with their ranks in individual fields. For each field, a university gets the points indicated below. The composite score for an institution is the sum of the points for all fields in which it was rated.

DISTINGUISHED/STRONG- - - - - -Inverse rank + 14 points*

GOOD- - - - - - - - - - - - - - -10 points

ADEQUATE PLUS - - - - - - - - - - 5 points

*BY USING THIS METHOD, WEIGHT IS GIVEN TO FIELDS WHICH HAVE THE GREATEST NUMBER OF *DISTINGUISHED/STRONG* ENTRIES. THE CONSTANT OF 14 ASSURES THAT EVEN THE LOWEST IN THIS CATEGORY GET FIVE MORE POINTS THAN THOSE RATED *GOOD*.

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[11] R.L. Jacobson, "Ratings of Graduate Departments," p. 9.

[12] R. Ewell, "A Quantified Summary of the American Council on Education Report 'An Assessment of Quality in Graduate Education' [Cartter Study]" mimeographed (SUNY at Buffalo: Office of the Vice-President for Research, December, 1967).

Ewell notes in his report, "I checked this rating system with Dr. Cartter, and he felt that this was the best of several systems which had been proposed to convert his disciplinary data into composite ratings for inter-university comparisons."[13]

When the departmental evaluations gathered by the Roose-Andersen study are weighted and summed by Ewell's method we have a composite score for each institution. Such a conversion was tabulated by J. William Johnston, and his summary provided the basic institutional scores cited in the paragraphs and tables that follow.[14] The relation of institutional characteristics and department ratings has been the object of some speculation but not of definitive study.[15]

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[13]Ibid., p. 2.

[14]J.W. Johnson, "A Composite Ranking of Institutional Graduate Disciplines Based on the American Council on Education Report 'A Rating of Graduate Programs' [Roose-Andersen study]" mimeographed (University Park: The Pennsylvania State University, September 1, 1971).

[15]R. Smith and F.E. Fiedler, *The Measurement of Scholarly Work in Academic Institutions*; Technical Report No. 70-2 (Seattle, Washington: University of Washington, February, 1970).

THE AIM AND METHOD OF THE STUDY

In the present study certain objective information about institutions is compared with the aggregated Ewell ratings. The central focus is on Pennsylvania institutions. They are compared with those of Ohio, Michigan, New York, Massachusetts, Illinois, and California. This frame of reference allows some comparison of the collective rankings for Pennsylvania with states that are similar in population: Ohio, Illinois, and Michigan, and with states that have a somewhat similar pattern of public and private institutions: Ohio, Massachusetts, and New York. It also permits a contrast of Pennsylvania with states that are heavily committed to public higher education: California, Michigan, and Illinois. Pennsylvania merits this distinctive set of comparisons because of its unusual pattern of public support. For some years now it has been the practice to provide Commonwealth funds to three classes of institutions that are known as "state-owned," "state-related," and private "state-aided." From total higher education appropriations of $261 million in 1970-71, the fourteen "state-owned" colleges have been financed by the state in the amount of $73 million. A larger segment of the state funds for higher education has been selectively distributed--some would say scattered--among the "state-related" institutions ($148 million) and the "state-aided" institutions

($23 million). The Roose-Andersen data in an aggregated form offer a means of commenting on this practice of distributing support among a group of quasi-public and semi-public institutions.

Another set of more general comparisons is also reported in this study. The rankings which originate with professorial judgments are correlated with other institutional attributes to see whether there are any marked associations between the gross features of an institution--total enrollment, graduate enrollment, for example--and the collective score or rankings.

Roose has recently studied the characteristics of the 50 top-rated institutions, drawn from the 130 whose programs were rated in 1969. He feels that analysis of the top 50 is especially critical in a period characterized by budgetary restraint and limited expansion. For this reason, the present study considers characteristics of the top 50 as well as of the selected states. In all comparisons, each institution is described in terms of the following characteristics:

1. Rank-order of institution by composite score
2. Ewell composite score
3. Number of fields rated
4. Total enrollment
5. Graduate enrollment

6. Percent of total enrollment accounted for by graduate enrollment

7. Type of control, public or private

RESULTS

Preliminary Comments

Three qualifications need to be stated at the outset of this presentation. First, the present study is essentially a descriptive one. It simply introduces a comparison of relationships that were not included in the original Roose-Andersen analysis but which may show interesting relationships. The features portrayed are characteristics of the educational landscape rather than origins of institutional excellence. Second, the effect of a top-rated department on the judgments given other departments within that institution cannot be accurately gauged.[16] However, it would seem reasonable to hypothesize that a university is more than the sum of its parts and thus the effect of a top department would be more than merely additive. That is, if the present study errs slightly in measuring overall institutional rating, it does so on the side of underplaying the total quality of individual institutions.

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[16]Smith and Fiedler, *Measurement of Scholarly Work*.

Third, it should be kept firmly in mind that the ratings are of *graduate* programs. What direct and indirect effects such quality has on the undergraduate education, research, and service activities of particular institutions is not only difficult to measure but highly idiosyncratic to the local campus setting. Spin-offs from graduate quality are, no doubt, plentiful. They are not, however, within the scope of this paper.

The Top Fifty

Table 1 above displays the institutions whose composite scores place them in the top fifty in the nation. The table also indicates number of fields rated, the various indexes of enrollments, and type of control for each institution. This particular collection of data allows us to examine the relationship between a ranking based upon peer judgment and several attributes of an institution. Product moment correlations were computed by Pearson's method for the intercorrelation of all variables. For convenience, a level of probability of $\leq .05$ is taken as significant.

We turn first to the relationship between composite score and the number of fields rated. Considering the fact that there is a prescreening which determines whether a field at a given institution is even included in the evaluation survey, one might hypothesize that the more fields an institution has rated, the better its position might be. This supposition is supported by the possibility that excellence in one field, mathematics for example, might have a "halo" effect upon judgments made of other

TABLE 1

TOP 50 INSTITUTIONS: RANKED BY COMPOSITE SCORE

Institution	Rank	Composite Score	Fields Rated	Total Enroll.	Graduate Enroll.	% Total In Graduate Enroll.	Control Pub=P Priv=I	Doctorates Awarded 1946-66
U.C. - Berkeley	1	1156	35	28863	9144	31.7	P	3238
Harvard	2	1095	34	19136	6268	46.1	I	2433
Michigan	3	964	36	37283	10328	27.7	P	2603
Stanford	4	945	32	11556	5326	46.1	I	1935
Yale	5	919	34	8665	3035	35.0	I	1800
Wisconsin	6	912	36	32000	8782	26.6	P	2730
Chicago	7	853	31	10464	6041	57.7	I	2079
Princeton	8	844	32	4756	1478	31.1	I	1721
Illinois	9	819	36	44806	9387	21.0	P	3933
Cornell	10	790	33	14102	3870	27.4	I	2007
U.C.L.A.	11	788	34	29070	8759	30.1	P	1005
Columbia	12	734	34	17459	6528	37.3	I	2501
U of Washington	13	662	34	30357	6560	21.6	P	909
U of Penn	14	642	32	19417	6606	34.0	I	1044
M I T	15	642	20	7730	3390	43.9	I	4354
Minnesota	16	611	33	58304	8457	14.5	P	1470
Johns Hopkins	17	605	26	11278	3072	27.2	I	1385
Indiana	18	579	32	47806	11009	23.0	P	675
Texas	19	576	32	30628	5538	18.0	P	1229
Cal Tech	20	513	16	1520	774	50.9	I	1714
Northwestern	21	510	32	17239	4084	23.7	I	1123
Brown	22	399	24	5042	1528	30.3	I	675
Duke	23	398	23	7552	1622	21.5	I	481
Purdue	24	397	21	34263	5201	15.2	P	2197
North Carolina	25	390	25	15601	3483	22.3	P	592
Michigan State	26	389	30	38758	10439	26.9	P	617
N Y U	27	363	28	34582	14602	42.2	I	1324
Ohio State	28	352	32	38834	7602	19.6	P	2215
Washington U	29	344	25	11908	2548	21.4	I	454
U of Rochester	30	330	24	8423	2043	24.3	I	548
Iowa	31	300	29	18659	4777	25.6	P	1061
Rockefeller U	32	295	10	138	128	92.8	I	4
Brandeis	33	294	15	2707	744	27.5	I	71
Case Western Res	34	291	21	10927	3606	33.0	I	792
Penn State	35	288	28	33742	5009	14.9	P	1379
Oregon	36	282	24	13980	3530	25.3	P	149
U.C. - Davis	37	281	16	10161	2367	23.3	P	100
Colorado	38	259	28	18280	4195	23.0	P	589
U of Pittsburgh	39	238	26	22067	7665	34.7	P	819
U.C. - San Diego	40	236	10	3070	1148	37.4	P	no data
SUNY Buffalo	41	230	24	19113	4781	25.0	P	176
Kansas	42	223	26	15791	3198	20.3	P	538
Iowa State	43	209	18	16925	2696	15.9	P	1498
Rice	44	209	19	2830	816	28.8	I	437
Southern Cal	45	206	23	18692	6223	33.3	I	261
Syracuse U	46	192	26	20254	4382	21.6	I	401
Rutgers	47	187	21	15142	5767	38.1	P	459
Vanderbilt	48	186	21	5558	1198	21.6	I	226
Virginia	49	185	18	18379	6861	37.3	P	538
Carnegie Mellon	50	168	9	5228	1406	26.9	I	974

Sources: Rank, Composite Score (Johnston)
Number of Fields Rated (Roose-Andersen)
Control, Enrollment--as of 1968-69--(National Center for Educational Statistics)
Doctorates Awarded--(Doctorate Recipients from U.S.--N.A.S.)

disciplines; physics, astronomy, and engineering, for example. A significant relationship of r = .72 was found between the composite score and the number of fields rated. This suggests that an institution striving to improve its position in these national rankings might be wiser to consider a strategy for general improvement in a number of fields rather than a concentration upon one or two "star" departments.

It might also be hypothesized that the ratings might be improved by having more students enrolled since alumni might then constitute a greater share of the professionals making the judgment. When enrollment of the institution was compared with the composite score, a correlation of .26 was generated. This degree of association does not support the hypothesized notion, but perhaps it is only the graduate students who should be counted since the rating deals with graduate activity. When graduate enrollment was compared with composite score, a slightly increased correlation coefficient was generated, r = .34, but it is much too low to support any idea about a significant influence of one factor upon the other. Viewed through the eyes of an institution that aspires to improve its ranking, these data suggest that merely undertaking a program for growth in the number of graduate students will not materially aid quality.

Enrollment figures, however, are momentary and may or may not accurately reflect a university's production of scholars over an extended period of time. When we consider the number of doctorates which each institution has awarded in the

twenty-year period ending in 1966, it is found that this figure correlates well with composite score, r = .72, significant.

A larger number of professionals having graduated from a particular institution would appear to have a favorable effect on ratings in at least two ways. First, a greater number of raters will have experienced a direct exposure to the institution's programs. Second, more raters will have indirect knowledge of the institution's program through contact and interaction with colleagues who have attended that institution.

In terms of relative quality as reflected in the composite scores of the top fifty there is little difference between the public and private groups. Private institutions show a slightly higher mean score, 510 vs. 470, but this is not significant. When each of the groups is examined by correlating scores with enrollment, some interesting distinctions appear. The public institutions tend to have significantly larger enrollments, as one might expect, with graduate students constituting about 25 percent of the total. Private institutions with smaller average enrollments have a larger share of their students in graduate study, 35 percent. Among the public institutions there is a significant correlation between total enrollment and composite score, r = .55, and a similar relationship between graduate enrollment and composite score, r = .68. This condition does not appear among the private institutions.

Focusing on Pennsylvania

The next phase of comparison considers the Pennsylvania institutions which fall into the total group of rated institutions consisting of 130 universities nationwide. Because our concern is for the Commonwealth as a whole, all data for institutions in the Commonwealth has been grouped. Three Pennsylvania institutions fall outside the top 50, but within the total 130 (Bryn Mawr, Lehigh, and Temple), while four (Penn, Penn State, Pitt, and Carnegie-Mellon) are within the upper group.

TABLE 2

BASIC DATA FOR
SELECTED INSTITUTIONS IN SEVEN STATES

Table 2A

Pennsylvania

A Institution	B Rank	C Composite Score	D Fields Rated	E Total Enroll.	F Graduate Enroll.	F/E % Total in Grad. Enroll.	G Control
U of Penn	14	642	32	19417	6606	34.0	PVT*
Penn State	35	288	28	33742	5009	14.9	PUB‡
U of Pitt	39	238	26	22067	7665	34.7	PUB‡
Carnegie-Mellon	50	168	9	5228	1406	26.9	PVT
Bryn Mawr	62	101	10	1152	585	50.8	PVT
Lehigh	87	49	3	4982	1830	36.7	PVT
Temple	109	15	3	33284	6197	18.6	PUB
TOTALS		1501	111	119872	29298	= (24.4)	
MEANS			15	17124	4185		

*State-Aided
‡State-Related

Pennsylvania vs. the Top Fifty: A first step is to compare collected information on Pennsylvania institutions with the aggregate data for the top fifty institutions. On several characteristics there is no real difference. Mean total enrollments are about the same and graduate enrollments are also very similar. In regard to the number of fields rated, however, there is a rather surprising difference. For the top fifty universities the mean number of fields rated is twenty-six, while for Pennsylvania the mean is only fifteen.

This condition reflects more specialization within institutions of this state than one finds in the group of top institutions nationally. It suggests that the Commonwealth, to improve the general quality of its graduate education, might examine the variety of graduate offerings at principal institutions to insure a full measure of opportunity for its most able citizens.

Pennsylvania vs. Selected States: A second step involves the comparison of Pennsylvania data with collected information of other states. Information on Pennsylvania institutions is contained in the table above. The states in the present sample accounted for twenty-eight of the top fifty (56 percent). By individual states we find the following distribution of those in the top fifty versus those in the total sample: Pennsylvania--

4:7, Ohio--2:4, Michigan--2:3, New York--7:12, Massachusetts--3:6, Illinois--3:6, and California--7:10. Detailed information for other selected states is provided in the series of tables which follows.

TABLE 2

BASIC DATA FOR
SELECTED INSTITUTIONS IN SEVEN STATES

Table 2B

Ohio

A Institution	B Rank	C Composite Score	D Fields Rated	E Total Enroll.	F Graduate Enroll.	F/E % Total in Grad. Enroll.	G Control
Ohio State	28	352	32	38834	7602	19.6	PUB
Case Western Reserve	34	291	21	10927	3606	33.0	PVT
Cincinnati	71	78	11	26627	3804	14.3	PUB
Ohio U	113	5	1	16287	1898	11.7	PUB
TOTALS		726	65	92675	16910	= (18.3)	
MEANS			16	23168	4227		

Table 2C

Michigan

A Institution	B Rank	C Composite Score	D Fields Rated	E Total Enroll.	F Graduate Enroll.	F/E % Total in Grad. Enroll.	G Control
Michigan	3	964	36	37283	10328	27.7	PUB
Michigan State	26	389	30	38758	10439	26.9	PUB
Wayne State	84	50	9	32370	6939	21.4	PUB
TOTALS		1403	75	108411	27706	= (26.0)	
MEANS			25	36137	9235		

Table 2D

New York

A Institution	B Rank	C Composite Score	D Fields Rated	E Total Enroll.	F Graduate Enroll.	F/E % Total in Grad. Enroll.	G Control
Cornell	10	790	33	14102	3870	27.4	PVT
Columbia	12	734	34	17459	6528	37.3	PVT
N Y U	27	363	28	34582	14602	42.2	PVT
U of Rochester	30	330	24	8423	2043	24.3	PVT
Rockefeller U	32	295	10	138	128	92.8	PVT
SUNY Buffalo	41	230	24	19113	4781	25.0	PUB
Syracuse U	46	192	26	20254	4382	21.6	PVT
Yeshiva U	53	145	8	5528	1513	27.4	PVT
Brooklyn Poly	68	81	6	5715	2995	52.4	PVT
Rennselaer	77	60	8	5144	1355	26.3	PVT
Fordham	99	20	4	10542	1897	18.0	PVT
New School	99	20	4	2609	2125	81.5	PVT
TOTALS		3260	209	143609	46219	= (32.2)	
MEANS			17	11967	3851		

Table 2E

Massachusetts

A Institution	B Rank	C Composite Score	D Fields Rated	E Total Enroll.	F Graduate Enroll.	F/E % Total in Grad. Enroll.	G Control
Harvard	2	1095	34	19136	6268	32.8	PVT
M I T	14	642	20	7730	3390	43.9	PVT
Brandeis	33	294	15	2707	744	27.5	PVT
U of Mass	54	134	17	15202	3467	22.8	PUB
Boston U	88	45	9	23011	5134	22.3	PVT
Tufts	93	35	6	5048	825	16.3	PVT
TOTALS		2245	101	72834	19828	= (27.2)	
MEANS			16	12139	3304		

Table 2F

Illinois

A Institution	B Rank	C Composite Score	D Fields Rated	E Total Enroll.	F Graduate Enroll.	F/E % Total in Grad. Enroll.	G Control
Chicago	7	853	31	10464	6041	57.7	PVT
Illinois	9	819	36	44806	9387	21.0	PUB
Northwestern	21	510	32	17239	4084	23.7	PVT
Illinois Tech	84	50	7	8471	2023	23.9	PVT
Southern Ill	97	25	4	19260	3736	19.4	PUB
Loyola (Chicago)	109	10	2	12651	3133	24.8	PVT
TOTALS		2267	112	112891	28404	= (25.2)	
MEANS			20	18815	4734		

Table 2G

California

A Institution	B Rank	C Composite Score	D Fields Rated	E Total Enroll.	F Graduate Enroll.	F/E % Total in Grad. Enroll.	G Control
U.C.--Berkeley	1	1156	35	28863	9144	31.7	PUB
Stanford	4	945	32	11556	5326	46.1	PVT
U.C.L.A.	11	788	34	29070	8759	30.1	PUB
Cal Tech	20	513	16	1520	774	50.9	PVT
U.C.--Davis	37	281	16	10161	2367	23.3	PUB
U.C.--San Diego	40	236	10	3070	1148	37.4	PUB
Southern Cal	45	206	23	18692	6223	33.3	PVT
U.C.--Riverside	57	122	13	4183	1121	26.8	PUB
Claremont Grad School	75	64	7	968	939	97.0	PVT
U.C.--San Fran Med	76	62	4	2338	394	16.6	PUB
TOTALS		4373	190	110421	36195	= (32.8)	
MEANS			19	11042	3620		

We have already noted that the policy by which institutions of higher learning receive funds in Pennsylvania is unique. There are "state-owned" institutions--the fourteen state colleges, a group of three "state-related" Commonwealth universities, and three major "state-aided" private institutions. In effect, the resources of the state are distributed rather than concentrated in a smaller group of wholly public institutions. New York is the only counterpart in this tradition, although that state has undertaken major change toward the development of strong public institutions over the last decade.

The two states are quite similar in average number of fields rated. This appears to confirm the idea noted above that when state support is extended to more institutions, more specialization in graduate programs develops. On the matter of average total enrollment there is less similarity, with New York institutions showing a mean of 11,967 and Pennsylvania--17,124. The share of the enrollment in graduate programs is quite different, 32 percent in New York and only 24 percent in Pennsylvania. Pennsylvania may have good reason to expand its graduate opportunity, as well as the number of programs offered.

However, the particular policy of state funding for private institutions may or may not bear any relationship to the actual existence of quality graduate level institutions in that

state. For example, Massachusetts is very heavily represented by the private sector, yet the state allocates absolutely no funds for the direct operating costs of private institutions. Clearly then, we need to examine the broader question of the rated quality of public and private institutions in the selected states irrespective of state policy.

Table 3 shows a summary of rated quality in the seven selected states aggregated by control. It is from this information that differences between the states can be seen most vividly. Not merely state policy but historical development is reflected in the particular divisions between public and private. On one polar extreme are New York and Massachusetts, which up until very recently have both placed the burden for graduate level work on the private institutions of the state. At the other extreme is Michigan which gains all of its composite strength from public institutions. Pennsylvania occupies middle ground, splitting seven institutions about as evenly as one can mathematically, with "three and one-half" institutions in each category. Ohio and Illinois fall on either side of Pennsylvania, with Ohio leaning toward the New York-Massachusetts policy and Illinois tending toward Michigan's. California shows a rather balanced posture and great strength, with somewhat more power in the public sector.

TABLE 3

NUMBER OF INSTITUTIONS AND SUMMED COMPOSITE SCORES
FOR SELECTED STATES AND BY CONTROL WITHIN STATES

	All Institutions			Public Institutions		Private Institutions	
State	Number of Institutions Represented	Sum of Composite Scores	Average Score Per Institution	No. of Public Institutions Represented	Sum of Public Composite Scores	No. of Private Institutions Represented	Sum of Private Composite Scores
Pennsylvania	7	1501	214	3 ǂ	541	4*	960
Ohio	4	726	182	3	435	1	291
Michigan	3	1403	468	3	1403	0	0
New York	12	3260	272	1	230	11	3030
Massachusetts	6	2245	374	1	134	5	2111
Illinois	6	2267	378	2	844	4	1423
California	10	4373	437	6	2645	4	1728

ǂIncludes two "state-related" institutions.
*Includes one "state-aided" institution.

The mean scores for the rated institutions in each state may be taken as a rough indication of what that particular state is getting as a return on its total investment, public and private, in graduate education. Pennsylvania is clearly better off than Ohio but substantially below all the others. However desirable it might be, one can say little more on this matter because a number of the institutions are really national or international in the scope of their clientele, thus encompassing more than state interests.

One can also see quite clearly from this table that the states vary in regard to their relative concentration or dispersion of quality graduate programs among institutions. Regarding the subject of dispersion, one can quickly see from Table 3 that Pennsylvania amasses a composite score very near Michigan's, but does so through seven institutions in contrast to Michigan's three. California reflects a higher composite score than New York with fewer institutions, while Massachusetts and Illinois have comparable scores with a like number of institutions for each.

Another way to compare Pennsylvania with other states is through an analysis of states with roughly equivalent populations as seen in Table 4. Ohio and Illinois come closest to Pennsylvania, and one might expect them to show roughly equivalent quality levels. The three, however, show very different total composite scores of quality. Pennsylvania's score is

TABLE 4

SUMMED COMPOSITE SCORES IN SELECTED STATES
AS A FUNCTION OF POPULATION IN STATE

A State	B Sum of Composite Scores	C Population of State* (in thousands)	B/C Score Points Per Capita	Rank
Pennsylvania	1501	11,750	.128	6
Ohio	726	10,610	.068	7
Michigan	1403	8,673	.162	5
New York	3260	18,186	.179	4
Massachusetts	2245	5,438	.413	1
Illinois	2267	10,958	.207	3
California	4373	19,179	.228	2

*As of July 1, 1968

SOURCE: Department of Commerce, Bureau of the Census, *Statistical Abstract of the United States, 1970.*

more than double that of Ohio, and Illinois' is half again higher than Pennsylvania's. The table presents a ratio of judged quality per state to population. While this measure is meant to assess general accessibility to quality graduate programs for residents of a state, it does not reflect two other important attributes of actual access--degree of selectivity and

amount of student cost.[17] If one takes the ratio of scores to population, it is clear that Pennsylvania extends to its citizens a rather limited opportunity for graduate study of high quality.

Table 5 shows another aspect of general accessibility. The population under scrutiny here, however, is college students who are residents of the selected states. The first comparison relates total score to the number of residents who are students at some college in the United States. The second comparison is of quality scores to the number of residents who attend college in their home state. Table 5, may be taken as an indication of the quality level a state offers, first, to all its students, and second, to those who choose to remain in the state. Pennsylvania retains its relatively low position in terms of the whole student group, but it is quite similar to New York. We notice, however, that Pennsylvania has the smallest share of students remaining at home. The ratio of quality to students, Column B/E, looks good--comparable to Michigan, New York, and even California--until we remind ourselves that this is achieved by having more than a fifth of the student population go elsewhere.

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[17]W. Willingham, *Free-Access Higher Education* (New York: College Entrance Examination Board, 1970).

TABLE 5

SUMMED COMPOSITE SCORES IN SELECTED STATES
AS A FUNCTION OF NUMBER OF STUDENTS

	All College and University Students			Students Attending in Home State		
A	B	C	B/C	D	E	B/E
State	Sum of Composite Scores	No. of Student Residents of State*	Ratio of Sum of Composite Scores to No. of SRoS	% Residents in Home State	No. of Students Remaining** in Home State	Ratio of Sum of Composite Scores to SRe
Pennsylvania	1501	350,287	.0043	78	272,846	.0055
Ohio	726	310,621	.0023	84	259,604	.0028
Michigan	1403	277,135	.0051	92	255,563	.0055
New York	3260	742,182	.0044	81	604,532	.0054
Massachusetts	2245	203,212	.0111	79	160,281	.0140
Illinois	2267	385,221	.0059	79	304,182	.0075
California	4373	810,208	.0054	94	762,198	.0057

*Student Residents defined as... "the residents of a State who are enrolled as students in their own State or any other part of the aggregate United States. Foreign students are not included (page x)."

**Those residents attending college in their home state.

SOURCE: National Center for Educational Statistics, Residence and Migration of College Students, Fall, 1968.

Because the composite scores reflect the quality of graduate programs only, there is reason for looking only at the graduate student population. Table 6 makes the same comparisons as Table 5 with only graduate students considered. A quick comparison of the percentage remaining in the home state as reflected in Table 5 and Table 6 reveals a little more mobility for the graduate students. Californians still find their opportunity at home as do the young people of Michigan. New York appears to have better holding power for its graduate students than for the whole range of student population. Pennsylvania still sends a sizeable 23 percent elsewhere and offers those who stay a graduate education of moderate quality. By and large the relationships remain the same among our seven sample states.

Looking into relationships in the Roose-Andersen report leads one to the question of how stable the results might appear in light of the earlier data of the Cartter report. To round out this obvious dimension of inquiry a set of composite scores for the 1964 report was calculated and the basic comparisons made. The comparison of composite scores for those in the top fifty in 1964 with those in the same group for 1969 showed a very high similarity, $r = .98$. Among the main subgroups reported in the paragraphs above--public vs. private, selected states vs. top fifty--no significant differences appeared. One interesting

TABLE 6

SUMMED COMPOSITE SCORES IN SELECTED STATES
AS A FUNCTION OF NUMBER OF GRADUATE STUDENTS

	All College and University Students			Students Attending in Home State		
A	B	C	B/C	D	E	B/E
State	Sum of Composite Scores	No. of Student Residents of State*	Ratio of Sum of Composite Scores to No. of SRoS	% Residents in Home State	No. of Students Remaining** in Home State	Ratio of Sum of Composite Scores to SRe
Pennsylvania	1501	46,857	.0320	77	35,972	.0417
Ohio	726	30,056	.0242	76	22,807	.0318
Michigan	1403	32,851	.0427	88	28,857	.0486
New York	3260	123,133	.0265	85	104,319	.0313
Massachusetts	2245	27,006	.0831	78	21,109	.1063
Illinois	2267	42,090	.0539	77	32,552	.0696
California	4373	91,544	.0478	90	82,256	.0531

*Parallels definition in Table 5; considers graduate students only

**Parallels definition in Table 5; considers graduate students only

SOURCE: National Center for Educational Statistics, Residence and Migration of College Students, Fall, 1968.

piece of additional information did emerge when the top fifty for each of the two years was split in half. The top twenty-five in the two reports showed a correlation of .95 by Pearson's method while the low twenty-five gave a value of .77. The locus of change is clearly at the lower end of the scale. The strategy for institutional improvement when confronted with this type of rating system is confirmed: attempt to bring many programs up to a good level and hold them there. While there is little likelihood of a new institution reaching the top twenty-five, the second twenty-five is still quite acceptable company. The major similarities we have noted suggest that a complete replication of this study using 1964 data would give rather similar results. The zone of change is the second quartile, as Table 7 shows.

TABLE 7

CORRELATION BETWEEN 1969 AND
1964 COMPOSITE SCORES
(PEARSON'S METHOD)

Top 50--All Institutions	.98*
Top 50--	
Upper 25 Only	.95*
Lower 25 Only	.77*
Top 50--	
Private Only	.98*
Public Only	.98*
Top 50--	
Selected States Only	.98*
Pennsylvania--All Rated Institutions	.99*

*Significant at $p \leq .05$.

CONCLUSIONS

By using the composite scores derived from the Roose-Andersen study as a reflection of the quality of graduate offerings in institutions, we have been able to generate some information and some indications that cannot be constructed easily by any other means.

First, the composite scores for institutions were tested for relationship with several other attributes: number of fields rated, total enrollment, and graduate enrollment.

1 -- There is a strong relationship between the number of fields rated and the composite score r = .72. This suggests that the avenue of institutional improvement lies in increasing the number of good departments in the graduate school rather than in creating one or two "star" departments.

2 -- In general, the size of the enrollment, either total or only graduate, is not significantly correlated with quality as measured by composite score. In the group of public institutions, however, there is an indication that larger numbers of graduate students do relate favorably to higher quality.

3 -- Institutions which have over an extended period of time awarded a large number of doctorates tend to be

rated highly. This is attested to by the high correlation between number of doctorates awarded in the last twenty years and composite score. Greater doctoral production allows greater familiarity with an institution's programs.

Second, the composite scores for institutions were aggregated for the top fifty schools on the list and for seven representative states to give a measure of centrality. The collected score for Pennsylvania's institutions was compared to those of the other states. Each of the six companion states held one or more points of similarity or contrast with Pennsylvania on population, policy, or tradition.

4 -- In comparison with the top fifty institutions, Pennsylvania showed fewer fields rated per institution, fifteen vs. twenty-six. In view of finding #1, above, and in the light of what is known about the beneficial cross-fertilization among departments, Pennsylvania might well encourage the development of a larger number of graduate programs in its better institutions.

5 -- In comparison with the seven selected states, Pennsylvania has a relatively low proportion of its total student enrollment in graduate work, 24

percent. Only Ohio is smaller. This reinforces the idea that graduate opportunity for citizens of the Commonwealth should be expanded.

6 -- When the scores of all institutions in a state are summed, we have an approximation of the quality level of graduate education, public and private, available to the people. The Pennsylvania institutions gathered a total of 1501 score points, placing the state fifth among the seven sample states.

7 -- When this total score is related in a simple ratio to the factors used in our study, the position of Pennsylvania slips back to sixth place. For example, the ratio of quality points per institution puts the state in the sixth position. The ratio of quality score points to population gives a per capita value which also places the state sixth (Table 4). A similar rank appears when the ratio of quality score points per student is calculated (Table 5), but here the unfavorable position is further intensified by the fact that a sizeable share of the students, 22-23 percent, leave the state to study.

8 -- A general conclusion is rather clear. Pennsylvania's unique policy of diversified support for higher

education does not, in and of itself, appear to be either favorable or unfavorable to the growth of quality in graduate study. To serve her citizens, Pennsylvania needs more graduate programs of good quality in its major institutions. Whether the current policy can encourage the kind of development needed to bring the Commonwealth up to the level of what might be called her "peer states" is the real question. And, in the light of the data presented here, the emphasis on more high quality graduate programs is no mere cry for expansion. It is the simple recognition of the need for an investment that has been too long postponed.

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Notes on the Authors

STEPHEN D. MILLMAN, a graduate assistant with the Center for the Study of Higher Education, is a Ph.D. candidate in administration of student affairs at Penn State. He received his master's degree in student personnel services from the University of Georgia and his bachelor's degree in psychology and sociology from the State University of New York at Buffalo. He has served as Resident Counselor at the University of Georgia and Assistant to the Dean of Student Affairs at Penn State's Capitol Campus. Mr. Millman writes a regular column for the NASPA Journal.

WILLIAM TOOMBS is research associate and Assistant Director of the Center for the Study of Higher Education. He received a Ph.D. from the Rackham School of Graduate Studies at the University of Michigan, where he also served on the staff. Prior to joining the Center, Dr. Toombs taught sociology at the college level and later became involved in the area of student affairs. He has served as director of a summer program of graduate and professional study for students and faculty from Southern black colleges and has worked with a YMCA interracial camp project. His research interests have included manpower analysis, financial aid, and the effects of sponsored research on graduate education.

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